

Integrating North American Air Emissions Data: Overview of the CEC's PRTR and Air Quality Efforts

Orlando Cabrera Rivera and Danielle Vallée
Commission for Environmental Cooperation of North America
393, rue St-Jacques Ouest, bureau 200, Montréal, Québec, Canada H2Y 1N9
ocabrera@cec.org

ABSTRACT

The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico and the United States under the North American Agreement on Environmental Cooperation (NAAEC). The CEC's Pollutants and Health Program comprises three components: the Air Quality Program, the Pollutant Release and Transfer Registers (PRTR) Project, and the Sound Management of Chemicals Program. Together, these aim at providing a more complete picture of the sources and amounts of pollution in North America to support access to information and decision-making in the management of air quality and pollutants.

The North American PRTR Project collects and analyses pollutant release and transfer information from the PRTR programs in the US, Mexico and Canada, and fosters communications and cooperation among the three countries in working toward the institutionalization and improvements of their respective PRTR systems. It also offers enhanced stakeholder access to the information for use in addressing environmental issues of concern at the local, national and tri-national levels.

A main objective of the Air Quality Program is to ensure that the capacity exists to develop comparable air emissions data for use in trans-border air quality planning, and enhance the public access to this information. Current efforts under the Air Quality Program include updating the Mexican National Emissions Inventory for the year 2005, using methodologies compatible with those of the US and Canada. The inventory project covers point, area, mobile and biogenic sources.

This paper presents an overview of the CEC's North American PRTR Project and Air Quality Program, and discusses the challenges of integrating industrial source data available from North American emissions inventories. The ability to integrate data which are comparable across inventories and borders should allow for their expanded use and ultimately, yield a better understanding of the air pollution picture in North America, and lead to sound air quality management initiatives.

Introduction

The CEC is an international organization created in 1994 by Canada, Mexico and the United States under the North American Agreement on Environmental Cooperation (NAAEC). It was established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law. This Agreement complements the environmental provisions of the North American Free Trade Agreement (NAFTA). The CEC's efforts in the area of air quality and pollutants seek to establish cooperative initiatives on a North American scale to prevent or correct the adverse effects of pollution on human and ecosystem health.

As a shared natural resource in North America, air is affected by emissions at the local, regional and North American levels, as well as from outside North America. It is therefore essential that the three countries cooperate to identify needs and priorities and to coordinate policies and programs to reduce air emissions and their environmental impacts. This information must also be made publicly accessible to stakeholders who can use and validate it, and in so doing, contribute to the decision-making process.

Air emissions inventories and pollutant registers are essential tools in addressing a number of environmental contamination and degradation issues including air quality, human health, atmospheric deposition, and water quality. Effectively addressing these environmental concerns across continental boundaries is hampered in part by the lack of consistent and complete air emissions inventory information.

This is an important challenge that needs to be addressed in order to develop an accurate and meaningful picture of air pollutant emissions at the North American scale – which will be the first step towards facilitating coordinated strategies to improve North American air quality.

Through the CEC, the environmental agencies of Canada, the United States and Mexico have agreed to work collaboratively towards common air quality objectives, including:

- Engaging in building capacity to ensure self-sustaining and comparable inventory, monitoring and other air quality efforts;
- Developing accurate, meaningful, and comparable data and analyses at the local, regional, and North American levels; and
- Facilitating coordination, coherence, and effectiveness of emissions reduction and air quality policies, regulations, strategies, and voluntary programs to maintain and improve North American air quality and public health.

Two specific CEC initiatives support these objectives. They are the North American Pollutant Release and Transfer Register (NAPRTR) Project and the Air Quality Program. As described below, these two initiatives have evolved separately, each with its distinct rationale, timeline, and outputs. Nonetheless, both aim to provide a more complete

picture of air pollutant emissions in North America, in order to support decision-making in the management of air quality and pollutant emissions.

CEC's North American Pollutant Release and Transfer Register (NAPRTR) Project

The main objectives of the NAPRTR Project are to compile and disseminate information on the amounts, sources, and management of toxic contaminants from industrial activities in North America, and to promote the use of this information for the development of sound initiatives that will result in the reduction of industrial releases and transfers of pollutants of concern across the region.

Begun in 1996, the NAPRTR project initiative has been one of the key components of the CEC's ongoing work on pollutants and environmental health, collecting and analyzing information from the PRTR programs in North America on the amounts, sources, and handling of toxic chemicals. This information is made available to a spectrum of users, including local governments, industry, nongovernmental organizations, and the general public, through the CEC's flagship publication, *Taking Stock*, and related website and searchable database, *Taking Stock Online* (<www.cec.org/takingstock>).

The *Taking Stock* report provides details about substances reported to Canada's National Pollutant Release Inventory (NPRI), the US Toxics Release Inventory (TRI), and more recently, Mexico's *Registro de emisiones y transferencia de contaminantes (RETC)*. The report also analyzes releases over time of certain categories of chemicals, including carcinogens and developmental/reproductive toxicants; and certain editions have taken a detailed look at releases of specific chemicals (e.g., lead, dioxins and furans). In addition, *Taking Stock* features a special chapter on a particular issue of interest – for instance, in the report to be released in 2008, the special feature chapter will take a closer look at the petroleum industry in North America.

This publication is the result of coordination between the CEC and the PRTR programs of the three countries, as well as input received during the annual North American PRTR Consultative Group meeting, which brings together a variety of stakeholders to discuss the three national PRTR programs, the NAPRTR Project and the *Taking Stock* report.

Through the CEC, officials from the three countries have also collaborated on capacity-building efforts, including the establishment in 2002 of the *Action Plan to Enhance the Comparability of PRTRs in North America*. This plan, which was updated in 2005, identifies needs and corrective actions for consistent and comparable data collection and quality across the PRTR systems in North America. The data analyses conducted under the project provide the countries with baseline information useful for validating the information collected and improving the overall quality of their PRTRs.

A significant achievement and milestone for the NAPRTR Project was the establishment, in 2004, of mandatory reporting under the *RETC*, Mexico's national PRTR program. This led to the inclusion of data from Mexico for the first time in the *Taking Stock 2004* report, which was released in October 2007. Inclusion of Mexican data on industrial pollutant releases has provided a more complete picture of industrial pollution across North America.

CEC's Air Quality Program

The main objective of this program is to provide a more complete North American picture of air quality and air emissions to support decision-making on air quality management. The program also provides the infrastructure that allows the countries in North America to exchange information and work cooperatively in addressing issues related to emissions monitoring and inventories, which will inform air management strategies. This includes:

- Identifying air quality-related information and capacity needs of the three countries;
- Helping to ensure that the capacity exists to develop comparable air quality-related information and programs for North America;
- Developing information products to identify emerging trends and issues; and
- Informing decisions relevant to the shared environmental interests of the countries.

Differences in capacity to collect air emissions information, within and among the three countries, can hinder the development of an accurate North American air quality and emissions picture. Consequently, there is a strong need to develop common methods, techniques and capacities for estimating air emissions, and for managing the collected information in a manner that improves its accessibility to all stakeholders.

In 2001, Canada, the United States and Mexico agreed to work towards promoting comparability of air emissions inventory information in North America. A draft report on enhancing the comparability of North American air emissions inventories was prepared, providing an overview of existing inventories in the three countries, and outlining some of the challenges and priorities relative to improving comparability.

In 2004, the CEC published a report on air emissions of a select group of pollutants from North American power plants, based on data for the 2002 reporting year. This publication followed the CEC's 2002 report to Council, which evaluated challenges and opportunities for sustainable energy production in North America. The power plant report also supported a number of decision-making needs, including the development of scenarios for the use of different fuels in power generation, the development of emissions reduction strategies, and so on.

The CEC also carried out extensive work in the years 2003 and 2004 in promoting the development of North American air emissions inventories, by supporting Mexico's first national air emissions inventory. This national inventory was designed to meet Mexico's planning needs, as well as having direct applications to trans-border air quality planning.

The first Mexican National Emissions Inventory was completed in October 2006, and included data on emissions of criteria air pollutants for the year 1999.

The current focus under the Air Quality Program includes conducting a comprehensive assessment of emissions inventories and air quality networks in the three countries and supporting the update of the Mexican National Emissions Inventory for the 2005 data year. This assessment work (covering criteria, greenhouse gases, and hazardous air pollutants) will serve as the basis for developing a collaborative strategy to enhance North American air quality management. It supports the development of comparable emissions inventories and monitoring networks across North America, including:

- Expanding and improving current air emissions inventories, striving for comparability in methodologies and timing, and building capacity;
- Identifying key gaps among current inventory and monitoring systems where enhanced comparability and synchronicity could advance air quality management;
- Developing innovative mechanisms for cross-border emissions reductions from a variety of sources;
- Supporting existing programs, particularly in relation to current and intended uses of the data and air quality management objectives; and
- Providing the public with basic information on air quality and the environmental performance of emission sources.

Challenges related to integrating North American air emissions data

Integrating North American air emissions data from the variety of existing inventories, at all levels of government and across the three countries, can serve a number of purposes and ultimately, provide support for air quality management decisions based on sound information. However, certain challenges must be addressed, including:

1. Data quality and level of detail:

The usefulness of the integrated information will depend on the quality and level of detail of the original data. An inventory's level of detail usually depends on its intended uses or applications, such as descriptive analyses, risk assessments, tracking regulatory impact, or modeling transport and deposition. These intended uses will to a great extent dictate the frequency, methodology, quality and level of detail of data collection, and vary from one inventory to the next.

A related challenge is the difference in existing inventory reporting requirements. For example, an industrial facility providing air emissions reports to more than one program with different reporting thresholds could end up submitting different amounts for the same pollutant; or aggregate data for one inventory, but not the other. One inventory may require criteria air pollutants to be reported at the process level, while hazardous air

pollutants could be reported at the facility level. Process level information may also be required from only a cross section, and not from all the sources covered by an inventory.

In the case of PRTRs, facility reports do not provide much detail about how the data were collected and the methodologies that were used to calculate emissions. Moreover, while reporting is mandatory, the burden of responsibility for detecting errors and verifying the reasonableness of the reported information rests with the PRTR programs.

2. Synchronicity and accessibility of the data:

Inventories often have different schedules and coverage, meaning that data for a given year and/or source category might be available in one area, but not another. With the exception of Canada, national air emissions inventories in North America are for the most part updated every three years, but data collection can be staggered across the territory for the duration of the three-year period; whereas regional or local inventories might be updated more frequently.

For example, hazardous air pollutant (HAP) emissions from the oil and gas exploration and extraction facilities in the US are covered in the National Emissions Inventory (NEI) only every three years, while covered in Canada and Mexico on an annual basis.

Accessibility to data might also be hampered by the fact that, as mentioned, certain process-level data can be confidential and therefore not made available to the public.

3. Number and diversity of North American inventories:

Canada, the United States and Mexico each have national-level inventories, which include emissions from industrial facilities (point sources), as well as area, mobile, and biogenic sources. Each country also has state/provincial, local, and tribal air emissions inventories. In addition, each country has its national PRTR, as well as a number of state/provincial, and in some areas, municipal PRTRs, adding to the complexity of obtaining emissions information in a consistent manner.

In terms of scope, different air emissions inventories also cover different pollutants and source categories. PRTR data are limited by the industrial sectors that must report in each country, by certain employee and chemical thresholds, and by the number of chemicals that must be reported - therefore, the data represent only a fraction of total air pollution sources. These international PRTR reporting differences can make it difficult to create a true picture of North American industrial releases to air. In the map below (Figure 1), oil and gas extraction facilities in the province of Alberta (represented by the heavy concentration of red points in that area) are required to report to Canada's NPRI; and in Mexico, oil and gas extraction facilities must also report to RETC. However, this map lacks information for the same sector in the US, since oil and gas extraction facilities are not required to report to TRI. As previously indicated, air emissions from these facilities are reported to the US NEI.

Figure 1: Map of PRTR Reporting Facilities in 2004



A quick look at the number of facilities and types of air emissions reported through the three national PRTRs, in comparison with the national air emissions inventories, also provides a good example of the variation in inventory coverage across North America.

Figure 2: Industrial Emission Sources in North American National EI/PRTR, 2005

Inventory	Reporting sources	Air Sources	CAP	HAP
US TRI	24,000	~15,300		+
US NEI		~85,200	+	+
Canada's NPRI	8,600	~7,900	+	+
Mexico's RETC	~2,400	~1,693		+
Mexico's NEI (MNEI)		~6,000	+	

In figure 2, we see the large difference in inventory coverage in the United States, in terms of the number of industrial sources reporting air emissions to the NEI, as compared to its PRTR (TRI). It is important to note that despite this difference, the TRI covers a number of toxic air pollutants not included in the NEI.

This reflects the fact that each national inventory was developed for different reasons, and has evolved relatively independently of the others. For example, Canada's NPRI serves as the focal point for integrating data on air emissions of all pollutants, including criteria air pollutants (CAPs) and greenhouse gases (GHGs). In the United States and Mexico, the national PRTRs have remained fairly separate from CAP and GHG emissions inventories.

In Mexico, the RETC (PRTR) and MNEI both cover sources under federal jurisdiction. There are also PRTR programs in a number of Mexican states; however, these data are not incorporated into the national PRTR, nor are they easily accessible. Under the NAPRTR Project, the CEC is working to support the integration of Mexican state PRTR data into the national program, with the objective of streamlining the reporting process and improving the quality of reporting.

Conclusions

As a shared natural resource in North America, air is affected by emissions from sources located within and outside the continent. A wide number and variety of inventories currently exist at local, regional and national scales, collecting and publishing data on point, area, mobile and biogenic sources. These inventories are essential tools that can be used to address a number of environmental issues, including air quality, human health, atmospheric deposition, and water quality.

Yet in order to make the best use of these data at the North American scale, Canada, the US and Mexico must cooperate to identify needs and priorities relating to this diversity of inventory data; through the CEC, they can do so. However, effectively addressing environmental concerns across borders is hampered in part by the lack of consistent and complete air emissions inventory information related to:

- Data quality;
- Synchronicity and accessibility of the data; and
- The number and diversity of North American inventories.

Such issues are common among inventories that exist within each country; but they are accentuated across borders, due to each country's needs and uses of air emissions data; as well as to differing jurisdictional landscapes. However, through the CEC, the three countries are collaborating on an assessment of needs and information gaps in order to identify priorities and strategies for action on North American air emissions.

This trilateral effort, to be conducted by the end of 2008, has two major components: the first involves a comprehensive assessment of existing air emissions inventories and monitoring networks, to identify comparability issues, such as differing data collection methodologies and schedules. It will also identify key gaps among inventories at various levels, where enhanced comparability and synchronicity could advance air quality management.

The second component of this North American effort is capacity-building: the assessment of air quality-related information gaps and the capacity needs of the three countries will enable the three countries to develop recommendations and a strategy, or roadmap, to ensure that the capacity exists to develop comparable and accessible air emissions information across North America.

The benefits of this project will include:

- Enhanced data quality and better baseline information for use in national modeling and regulatory decision-making;
- Enhanced accessibility to air emissions data, thereby allowing greater input in the decision-making process by a variety of stakeholders; and
- Greater comparability of data across borders, enabling a more accurate picture of air pollution - which will help inform decisions relevant to the shared environmental interests of the three countries.

References

1. CEC Council Resolution 01-05: *Promoting Comparability of Air Emissions Inventories* (CEC, 2001) http://www.cec.org/files/pdf/COUNCIL/Res-05r9_EN.pdf
2. *Action Plan to Enhance Comparability Among Pollutant Release and Transfer Registers*: Council Resolution 02-05. CEC, 2002
http://www.cec.org/files/pdf/COUNCIL/ResolutionPRTR_en.pdf
3. Cooperating on Air Quality Management: the CEC's North American Air Vision: Presentation at the 14th Regular Session of CEC Council, Morelia, Michoacán, Mexico, June 26-27, 2007

http://www.cec.org/files/PDF/COUNCIL/CEC-Air-Vision_en.pdf
4. *Enhancing the Comparability of NA Air Emissions Inventories* (draft paper, CEC 2001)
5. *Taking Stock: 2004 North American Pollutant Releases and Transfers*. CEC, Sept. 2007
6. *Landa, Hugo*, 2008. Dirección General de Gestión de la Calidad del Aire y RETC Secretaría de Medio Ambiente y Recursos Naturales, Mexico, *personal communication*.
7. *Rodriguez Gallegos, M.*, 2008. Dirección General de Gestión de la Calidad del Aire y RETC Secretaría de Medio Ambiente y Recursos Naturales, Mexico, *personal communication*.
8. *North American Environmental Atlas*, CEC, 2007.
<http://www.cec.org/news/details/index.cfm?varlan=english&ID=2786>
9. 2005 National Emissions Inventory Data & Documentation, USEPA, 2008
<http://www.epa.gov/ttn/chief/net/2005inventory.html>
10. 2005 TRI Public Data Release, USEPA 2008.
<http://www.epa.gov/tri/tridata/tri05/index.htm>
11. *NPRI Databases (1994 – 2006)*, Environment Canada, 2008.
http://www.ec.gc.ca/pdb/npri/npri_prev_dat_e.cfm